

## IN THE CLAIMS

Claims -1-8 Cancelled

9. (Currently Amended) A method for the determination of an unknown state variable (x) of a system (1) from a measured value (y) for implementation in an arithmetic unit (4) of a sensor system (2), said method comprising the steps of:

obtaining a measured value (y) from a sensor system (2);

establishing a cost function which indicates deviation of the measured value (y) from calibration functions as a function of the unknown state variable (x);

establishing a relevant state region from the measured value (y);

establishing ~~a selection of~~ approximation regions (30) and establishing for each approximation region for at least one predetermined approximation function of the cost function in which a sum of the approximation ~~regions~~ function covers the entire relevant state region;

determining all local minima (40) of said at least one predetermined approximation function of the cost function in each of said approximation regions such that each minimum is determined in a respective approximation region by ~~a sum of a start vector and a weighted difference of the measured value from calibration values obtained from the calibration function as a function of said start vector;~~ and

determining a global minimum (50) by comparing said local minima

wherein said global minimum represents the state variable (x) of the system (1).

10. (Previously Presented) The method as claimed in Claim 9, wherein said cost function produces a weighting of deviations of the measured value (y) from the calibration values based on the accuracy of the measured value (y) or the calibration values.

11. (Previously Presented) The method as claimed in Claim 9, wherein said system (1) is an air data system of an airplane, and the cost function is expressed by the relationship:

$$c^2 = [y - (c_p q_c + p_s)]^T [\text{cov}(c_p) q_c^2 + \sigma_p^2]^{-1} [y - (c_p q_c + p_s)]$$

12. (Previously Presented) The method as claimed in Claim 9, wherein each of the local minima is determined from the expression:

$$x = x_0 + PHR^{-1}(x_0)[y - (c_p(x_0)q_{c0} + p_{s0})], \text{ wherein}$$

$$P(x_0) = \text{cov}(x) = (H^T R^{-1} H)^{-1},$$

$H(x_0) = \frac{dy}{dx}(x_0)$  from a pressure model expressed by the relationship:

$$y = q_c c_p(x) + p_s, \text{ and}$$

$$R(x_0) = \text{cov}(y) = q_c^2 \text{cov}(c_p)(x_0) + s_p^2.$$

13. (Previously Presented) The method as claimed in Claim 9, wherein the start vector is selected randomly in the respective approximation region.

14. (Previously Presented) The method as claimed in Claim 9, wherein said approximation regions are established from a quadratic approximation of the cost function.

15. (Previously Presented) The method as claimed in Claim 9, wherein the approximation functions are established such that each of the approximation functions yields only one minimum

Claim 16 - Cancelled.

17. (Previously Presented) The method as claimed in Claim 9, wherein the approximation function and the approximation region are produced in a recursive method prior to the step of establishing the cost function.

18. (Previously Presented) The method as claimed in Claim 9, wherein all the steps are carried out by the arithmetic unit (4).

19. (Previously Presented) A method for the determination of an unknown state variable (x) from a measured value (y) for implementation in an arithmetic unit (4) of a sensor system (2), said method comprising the steps of:

obtaining a measured value (y) from a sensor system (2);  
establishing a cost function which indicates the deviation of the measured  
value (y) from calibration functions as a function of the unknown state variable  
(x);  
establishing a relevant state region from the measured value (y);  
selecting an approximation function of the cost function from a selection  
of approximation functions of the cost function;  
establishing a selection of approximation regions (30) from the  
approximation function selected from the selection of approximation functions in  
which the sum of the approximation regions covers the entire relevant state  
region;  
determining all local minima (40) within the selection of approximation  
regions within the state region such that each minimum is determined by a sum  
of a start vector and a weighted difference of the measured value from the  
calibration as a function of said start vector, and  
determining a global minimum (50) by comparing said local minima  
wherein said global minimum represents the state variable (x) of the system (1).

20. (Previously Presented) The method as claimed in Claim 19, wherein  
said cost function produces a weighting of deviations of the measured value (y)  
from the calibration values based on the accuracy of the measured value (y) or  
the calibration values.

21. (Previously Presented) The method as claimed in Claim 19, wherein said system (1) is an air data system of an airplane, and the cost function is expressed by the relationship:

$$c^2 = [y - (c_p q_c + p_s)]^T [\text{cov}(c_p) q_c^2 + \sigma_p^2]^{-1} [y - (c_p q_c + p_s)]$$

22. (Previously Presented) The method as claimed in Claim 19, wherein each of the local minima is determined from the expression:

$$x = x_0 + PHR^{-1}(x_0)[y - (c_p(x_0)q_{c0} + p_{s0})], \text{ wherein}$$

$$P(x_0) = \text{cov}(x) = (H^T R^{-1} H)^{-1},$$

$H(x_0) = \frac{dy}{dx}(x_0)$  from a pressure model expressed by the relationship:

$$y = q_c c_p(x) + p_s, \text{ and}$$

$$R(x_0) = \text{cov}(y) = q_c^2 \text{cov}(c_p)(x_0) + s_p^2.$$

23. (Previously Presented) The method as claimed in Claim 19, wherein the start vector is selected randomly in the respective approximation region.

24. (Previously Presented) The method as claimed in Claim 19, wherein said approximation regions are established from a quadratic approximation of the cost function.

25. (Previously Presented) The method as claimed in Claim 19, wherein the approximation functions are established such that each of the approximation functions yields only one minimum

26. (Previously Presented) The method as claimed in Claim 19, wherein the approximation function has minima determined by means of analytical methods.

27. (Previously Presented) The method as claimed in Claim 19, wherein the approximation function and the approximation region are produced in a recursive method prior to the step of establishing the cost function.

28. (Previously Presented) The method as claimed in Claim 19, wherein all the steps are carried out by the arithmetic unit (4).

Add the following new claim:

29. (New) The method as claimed in claim 9, wherein each minimum approximation function of the cost function in each of said approximation regions is determined in a respective approximation region by a sum of a start vector and a weighted difference of the measured value from calibration values obtained from the calibration function as a function of said start vector.